



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Adress: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/581,277	06/01/2006	Takeo Tsukada	128242	3135
25944	7590	04/28/2008	EXAMINER	
OLIFF & BERRIDGE, PLC P.O. BOX 320850 ALEXANDRIA, VA 22320-4850			DOUGHERTY, THOMAS M	
ART UNIT	PAPER NUMBER			
	2834			
MAIL DATE	DELIVERY MODE			
04/28/2008	PAPER			

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/581,277	<b>Applicant(s)</b> TSUKADA ET AL.
	<b>Examiner</b> Thomas M. Dougherty	<b>Art Unit</b> 2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 14 March 2008.  
 2a) This action is FINAL.      2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-3,6-8 and 11-14 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-3,6-8 and 11-14 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 01 June 2006 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date: _____   | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Response to Arguments*

Applicants' arguments filed 3/14/08 have been fully considered but they are not persuasive. The Applicants' REMARKS and amended claims have been carefully considered. Regarding sections 'I' and 'II. A.' of the REMARKS (overview and discussion of the Tsukada reference): while Tsukada does not note a range of 1.3 to 4.2  $\mu\text{m}$ , his range is of 1 to 10  $\mu\text{m}$  and preferably 3-5  $\mu\text{m}$  clearly allows for, and thus anticipates, a grain size that encompasses and is within that claimed by the Applicants. As such he meets the structural requirements for a device having a  $Q_{\max}$  with respect to a third harmonic wave of thickness at 24MHz, or 8 or larger, as well as meeting the Applicants' required range of "1.4 to 4.2" and "60 MHz" with a  $Q_{\max}$  of "6 or larger". Regarding Tsukada's mole ratio of 4Bi/Ti, the argument is not made why that distinguishes the Tsukada reference from the Applicant's invention. If, as the Applicants maintain, that Tsukada's table 1 "only shows calculated values for " $Q_{\max}$ " based on the "measured impedance values" and "b", then, at a minimum Tsukada clearly teaches how to achieve  $Q_{\max}$  values. Starting at No.4 in his table 1, the Q values are at or above the required minimums claimed by the Applicants. Thus this argument is not persuasive.

Regarding section "II.B." of the Applicants' REMARKS, initially, the Examiner thanks the Applicants for indicating the correct surname on the reference and regrets any confusion that may have resulted from his confusing the first name and surname. Itakura notes MnO and GeO<sub>2</sub> contents which meet the Applicants' required range. As such it is not seen how the claimed particle size of the invention is not met by Itakura.

Itakura's range is still inclusive of the Applicants' range. Further, Itakura notes use of calcium as a substitute for either of Sr or Ba in his SOLUTION (translated patent abstract). While he does not explicitly note a stoichiometric formula, when Ca is substituted for Sr, the  $\alpha=1-\beta=0.9$  and  $\beta=0.1$ . These are values within the required ranges claimed by the Applicants.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3 and 6-8 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Tsukada et al. (JP 2001-220226). Tsukuda et al. show a piezoelectric element comprising a piezoelectric substance formed from a piezoelectric ceramic having ceramic particles, wherein: said ceramic particles comprise a bismuth layer (see SOLUTION) compound containing at least Sr, Ln (note that Ln is a lanthanoid element), Bi, Ti and O and including M<sup>II</sup>Bi<sub>4</sub>Ti<sub>4</sub>O<sub>15</sub> type crystal (M<sup>II</sup> is an element composed of Sr and Ln) as a main

component, and an oxide of Mn as a subcomponent; and an average particle diameter by the code length measuring method is 1.3 to 2  $\mu\text{m}$  (see paragraph [0020]).

Said  $M^{II}\text{Bi}_4\text{Ti}_4\text{O}_{15}$  type crystal is expressed by a composition formula  $(\text{Sr}_{\alpha}\text{Ln}_{\beta})\text{Bi}_{\gamma}\text{Ti}4015$ , wherein " $\alpha$ " satisfies  $\alpha = 1-\beta$ , " $\beta$ " satisfies  $0.01 \leq \beta \leq 0.50$  and " $\gamma$ " satisfies  $3.80 \leq \gamma \leq 4.50$ . See paragraph [0034] and table 1 for the  $\gamma$  values.

A content of said oxide of Mn is 0.1 to 1.0 wt% in terms of  $\text{MnO}$ . See paragraph [0034].

Tsukuda et al. show a piezoelectric element comprising a piezoelectric substance formed from a piezoelectric ceramic having ceramic particles, wherein: said ceramic particles comprise a bismuth layer (see SOLUTION) compound containing at least Sr, Ln (note that Ln is a lanthanoid element), Bi, Ti and O and including  $M^{II}\text{Bi}_4\text{Ti}_4\text{O}_{15}$  type crystal ( $M^{II}$  is an element composed of Ca and Ln, see paragraphs [0008] and [0011]) as a main component, and an oxide of Mn as a subcomponent; and an average particle diameter by the code length measuring method is 1.4 to 4.2  $\mu\text{m}$  (see paragraphs [0011] and [0020]).

Said  $M^{II}\text{Bi}_4\text{Ti}_4\text{O}_{15}$  type crystal is expressed by a composition formula  $(\text{Ca}_{1-\beta}\text{Ln}_{\beta})\text{Bi}_{\gamma}\text{Ti}4015$ , and " $\beta$ " satisfies  $0.01 \leq \beta \leq 0.50$  and " $\gamma$ " satisfies  $3.80 \leq \gamma \leq 4.50$ . See paragraph [0034] and table 1 for the  $\gamma$  values.

A content of said oxide of Mn is 0.1 to 1.0 wt% in terms of  $\text{MnO}$ . See paragraph [0034].

Given the invention of Tsukuda et al. as noted above, they further note that a maximum value  $Q_{\max}$  of "Q" ( $Q = IXI/R$ , wherein "X" is reactance and "R" is resistance)

between a resonant frequency and an antiresonant frequency with respect to a third harmonic wave of thickness vertical vibration is 8 or larger. See paragraphs [0007], [0040] and table 1 (see numbers 3-12 in the table where the range proceeds from almost 8 to above 11).

They further note that a maximum value  $Q_{\max}$  of "Q" ( $Q = IXI/R$ , wherein "X" is reactance and "R" is resistance) between a resonant frequency and an antiresonant frequency with respect to a third harmonic wave of thickness vertical vibration is 6 or larger. See paragraphs [0007], [0040] and table 1 (see numbers 3-13 in the table where the range proceeds from almost 8 to above 11 and to above 6).

They do not note the frequency employed, e.g. 24 MHz and 6 MHz respectively.

The frequency employed is not further limiting to the structure as claimed and therefore carries no patentable weight, instead it tends toward the manner in which the device is to be employed. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations.

*Ex parte Masham*, 2 USPQ2d 1647 (1987).

Claims 11-14 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Itakura et al. (JP 2003-335577). Itakura et al. teach (paragraph [0035]) a piezoelectric ceramics having ceramic particles, wherein: said ceramic particles comprises bismuth layer (see SOLUTION) compound containing at least Ba, Sr, Ln (note that Ln is a lanthanoid element), Bi, Ti and O and including  $M''Bi_4Ti_4O_{15}$  type crystal ( $M''$  is an element composed of Ba, Sr and

Ln) as a main component, and an oxide of Mn as a subcomponent; and an average particle diameter by the code length measuring method is 0.8 to 4.7  $\mu\text{m}$  (see paragraph [0022]).

Said M<sup>II</sup>Bi<sub>4</sub>Ti<sub>4</sub>O<sub>15</sub> type crystal is expressed by a composition formula (Ba<sub>1- $\alpha-\beta$</sub> Sr <sub>$\alpha$</sub> Ln <sub>$\beta$</sub> )Bi <sub>$\gamma$</sub> Ti4O15, and " $\alpha$ " satisfies 0.1  $\leq \alpha \leq$  0.6, " $\beta$ " satisfies 0.05  $\leq \beta \leq$  0.50 and " $\gamma$ " satisfies 3.80  $\leq \gamma \leq$  4.50. See values in paragraph [0035].

A content of said oxide of Mn is 0.1 to 1.0 wt% in terms of MnO. See paragraph [0018] and, a content of said oxide of Ge is 0.05 to 0.5% in terms of GeO<sub>2</sub>. See paragraph [0019].

Given the invention of Keisuke et al. as noted above, they further note that a maximum value Q<sub>max</sub> of "Q" (Q = IXI/R, wherein "X" is reactance and "R" is resistance) between a resonant frequency and an antiresonant frequency with respect to a third harmonic wave of thickness vertical vibration (paragraph [0007]) is 23 or larger (see table 1).

They do not note the frequency employed, e.g. 8 MHz.

The frequency employed is not further limiting to the structure as claimed and therefore carries no patentable weight, instead it tends toward the manner in which the device is to be employed. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations.

*Ex parte Masham, 2 USPQ2d 1647 (1987).*

**Conclusion**

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Direct inquiry to Examiner Dougherty at (571) 272-2022.

/T. M. D./

/Thomas M. Dougherty/

tmd

Primary Examiner, Art Unit 2834

April 24, 2008